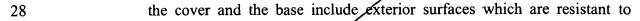
## CLAIMS

It is claimed:

١.,	<u>, 1</u>	1. A germicidal lamp for harsh environments adapted to be mounted on a wall, the
Hard Hard Hard Hard Hard Hard Hard Hard	$\frac{1}{2}$	wall having an insertion opening, the germicidal lamp comprising:
	3	a low pressure germicidal tube which, when energized, emits UVC without
	4	substantial ozone and can withstand skin-effect cooling, the tube including an envelope
	5	and a stem; and
	6	a fixture comprising a cover, a base and a tube-holder, wherein
	7	the base has an upper surface and a lower surface,
	8	the lower surface of the base seals against the wall to thereby prevent
	9	splashing water, hose-directed water, ice formations, wind, dirt, rain and environmental
	10	corrosion to pass there through,
	11	the cover is at least partially detachable from the base so that the cover can
	12	be moved from a first position wherein the cover covers the upper surface to a second
	13	position wherein the cover is at least partially separates from the base to at least partially
	14	expose the upper surface of the base,
	15	the cover and the upper surface of the base define an interior space within
	16	the fixture,
	17	the cover seals tightly to the base to thereby prevent splashing water, hose-
	18	directed water, ice formations, wind, rain and environmental corrosion from entering the
	19	interior space of the fixture.
	20	the base includes an opening through which the envelope of the tube is
	21	passed for installation of the tube in the fixture and removal of the tube from the fixture,
	22	installation of the tube seals the opening in the base of the fixture from air
	23	flow into the fixture,
	24	a tube-holder including an engaging surface adapted to engage and secure
	25	the stem of the tube,
	26	after the envelope has been inserted through the opening in the base of the
	27	fixture,

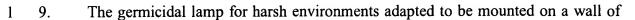
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- 29 splashing water, hose-directed water, ice formations, wind, rain and environmental
- 30 corrosion.
  - 1 2. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the tube comprises an elongate hollow cylinder.
- 1 3. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the tube is adapted such that UVC output from the tube peaks when an
- 3 air flow of between 200 cfm and 600 cfm at between 30°F and 65°F is passed across the
- 4 tube.
- 1 4. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 3 wherein the tube is adapted such that UVC output from the tube peaks when an
- 3 air flow of 400 cfm at 55°F is passed across the tube.
- 1 5. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the tube emits UVC of at least 10-μW/cm<sup>2</sup> per inch arc length at one
- 3 meter when an airflow of between 100 and 800 cfm is passed across the tube.
- 1 6. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the tube emits UVC of at least 10 μW/cm<sup>2</sup> per inch arc length at one
- 3 meter when an air flow of between 0°F and 70°F is passed across the tube.
- 1 7. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 having a weight of less than two lbs.
- 1 8. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the cover and the base of the fixture are separable.

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- 2 claim 1 wherein the cover and the base of the fixture have a clamshell design.
- 10. The germicidal lamp for harsh environments adapted to be mounted on a wall of 1
- 2 claim 1 wherein the base of the fixture includes the tube-holder.
- The germicidal lamp for harsh environments adapted to be mounted on a wall of 1 11.
- claim 10 wherein the tube-holder comprises a spring clamp attached to the upper surface 2
- of the base of the fixture around the opening in the base, the spring clamp comprising a 3
- spring, a mount and two stops, the spring comprising wire in a substantially flat U shape, 4
- the stem of the spring's U being fixed by the mount to the upper surface of the base 5
- adjacent the opening such that the arms of the U are disposed on opposite sides of the 6
- 7 opening, the mount allowing the spring to rotate such that the spring can be pivoted about
- 8 the mount between a position substantially parallel to the upper surface to a position
- 9 substantially perpendicular to the upper surface, the stops holding the spring in
- compression and parallel to the upper surface, wherein the spring clamp wraps at least 10
- 11 partially around the stem of the tube and presses the stem against the upper surface of the
- 12 base of the fixture and thereby holds the tube in place and the tube in the fixture.
- The germicidal lamp for harsh environments adapted to be mounted on a wall of 1 12.
- 2 claim 1 wherein the tube-holder is attached to the cover of the fixture, wherein the tube-
- 3 holder is positioned in the cover such that, when the cover is closed onto the base of the
- 4 fixture, the tube-holder also engages the stem of the tube and holds the tube firmly in
- 5 place.
- 1 13. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the tube-holder includes an electrical connector which engages at least
- 3 one electrode in the stem of the tube when the tube-holder engages the stem.

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- 14. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the plural seals are further adapted to be seated around the opening in the
- 3 / base to thereby prevent splashing water, hose-directed water, ice formations, wind, dirt,
- 4 rain and environmental corrosion to pass there through.
- 1 15. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 wherein the seals between the fixture and the wall can withstand air pressure of at
- 3—least 15 inches of water gage.
- 1 16. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1, cover and the base of the fixture defining an interior space, the fixture further
- 3 comprising a power supply adapted to convert an input power source into a form
- 4 appropriate for the tube.
- 1 17. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1 further including an electrical connector disposed within the fixture adapted to
- 3 electrically engage the stem of the tube, the germicidal lamp further including plural.
- 4 electrical leads attached to the electrical connector and extending outside of the fixture,
- 5 the leads including piggyback connectors adapted to be connected to an air conditioner's
- 6 power or fan controller, whereby other connectors on the controller can be removed from
- 7 the controller and attached to the piggyback connector, and the piggyback can then be
- 8 attached to the controller in place of the other connector.
  - 18. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1, wherein the seals between the tube and the fixture can withstand air pressure of
- 3 at least 30 inches of water gage.
- 1 19. The germicidal lamp for harsh environments adapted to be mounted on a wall of
- 2 claim 1, wherein the seals between the cover and the base can withstand air pressure of at
- 3 least 20 inches of water gage.

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- An air handling system comprising the germicidal lamp of claim 1. 1 20.
- An HVAC system comprising the germicidal lamp of claim 1. 1 21.

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A germicidal lamp for harsh environments comprising:

a single-walled tube having a stemmed end and a free end and comprising

an envelope disposed between the ends having a first cross-sectional

4 shape,

a rigid stem secured to the enyelope at the stemmed end, the stem

6 including at least one electrode; and

a fixture comprising:

a base having an upper surface and a lower surface, the base including an opening through which the envelope of the tube is passed for installation of the tube in the fixture and removal of the tube from the fixture, but through which the stem will not fully pass, the lower surface of the base sealing against a wall to thereby prevent splashing water, hose-directed water, ice formations, wind, rain and environmental corrosion to pass there through, the base including an exterior surface which is resistant to splashing water, hose-directed water, ice formations, wind, rain and environmental corrosion;

a socket disposed inside of the fixture and electrically coupled to at least one electrode;

a cover/which is at least partially detachable from the base so that the cover can be moved from a first position wherein the cover covers the upper surface and the cover can be at least partially moved away from the base to at least partially expose the upper surface of the base, the cover sealing tightly to the base to thereby prevent splashing water, hose-directed water, ice formations, wind, rain and environmental corrosion from entering the interior space of the fixture, the cover including an exterior surfaces which is resistant to splashing water, hose-directed water, ice formations, wind, rain and environmental corrosion;

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a tube-holder including an engaging surface adapted to engage and secure
the stem of the tube.

23. The germicidal lamp for harsh environments of claim 22, the tube-holder comprising a spring clamp coupled to the primary wall around the opening, the spring clamp comprising a spring, a mount and two stops, the spring comprising wire in a substantially flat U shape, the stem of the spring's U being fixed by the mount to the first wall adjacent the through-hole such that the arms of the U are disposed on opposite sides of the through-hole, the mount allowing the spring to rotate such that the spring can be pivoted about the mount from a position substantially parallel to the first wall to a position substantially perpendicular to the first wall, the stops holding the spring in compression and parallel to the first wall;

wherein the spring clamp wraps at least partially around the stem and presses the stem into the primary wall and thereby holds the tube in place.

- The germicidal lamp for harsh environments of claim 22 wherein the tube comprises a low pressure germicidal tube which, when energized, emits UVC without substantial ozone and can withstand skin effect cooling in an air flow of between 200 cfm and 600 cfm at between 30°F and 65°F.
- The germicidal lamp for harsh environments adapted to be mounted on a wall of
   claim 22 wherein the tube emits UVC of at least 10-μW/cm² per inch arc length at one
   meter when an airflow of between 100 and 800 cfm is passed across the tube.
- The germicidal lamp for harsh environments adapted to be mounted on a wall of
   claim 22 wherein the tube emits UVC of at least 10 μW/cm² per inch arc length at one
   meter when an air flow of between 0°F and 70°F is passed across the tube.
- 1 27. The germicidal lamp for harsh environments adapted to be mounted on a wall of claim 22 having a weight of less than two pounds.

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The germicidal lamp for harsh environments adapted to be mounted on a wall of 28. claim 22 wherein the seals between the fixture and the wall can withstand air of at least 15 inches of water gage.

- The germicidal lamp for harsh environments adapted to be mounted on a wall of 29. claim 22, wherein the seals between the tube and the fixture can withstand air pressure of at least 30 inches of water gage.
- The germicidal lamp for harsh environments adapted to be mounted on a wall of 30. claim 22, wherein the seal's between the cover and the base can withstand air pressure of 2 at least 20 inches of water gage. 3
- 1 31. An air handling system comprising the germicidal lamp of claim 22.
- An HVAC system comprising the germicidal lamp of claim 22. 1 32.

